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MELBOURNE, VICTORIA

Aircraft Structures Technical Memorandum 567

CREATING POSTSCRIPT FILES ON VAX COMPUTERS

by

Petra M. Cox

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CREATING POSTSCRIPT FILES ON VAX COMPUTERS

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Petra M. Cox

SUMMARY

Digital Standard Runoff is a utility provided by DEC for use on VAX computers. This utility creates formatted ascii text files of various simple lay-outs. However, it does not generate PostScript files or permit the inclusion of figures or algebraic expressions and equations. The present report describes a program which will permit the extension of RUNOFF to include these features. It also includes subroutines for the generation of PostScript graphic files, which can be included in the text files.

DSTO ARL MELBOURNE

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...ion For
...RA&I ☑
...ced ☐
...tion
...ribution/
Availability Codes
Dist | Avail and/or Special
A-1

1 TEXT FILES

1.1 LPL Command

LPL is a command procedure that creates formatted PostScript files from input files consisting of text, DSR commands, DSR flags and PMC commands, and sends the output file to the LN03R printer.

Format: LPL *filename*

It initially runs the DCL command RUNOFF with the qualifier /DEVICE=LN03, then runs the program CONVTPS to convert the RUNOFF output file from ascii to PostScript, and finally sends the PostScript file to the PostScript printer queue LN03R_P. The two output files created are *filename*.DAT which is the output file from RUNOFF, and *filename*.PS which is the PostScript file.

1.2 LPL Parameters

Three parameters are available.

1. norun - do not run RUNOFF.
2. nocon - do not run CONVTPS.
3. noprt - do not print output file.

1.2.1 Norun

Converts an existing RUNOFF output file to a PostScript file which it then sends to the printer.

Format: LPL *filename* norun

1.2.2 Nocon

Runs only the DCL command RUNOFF. The *noprt* parameter is automatically set.

Format: LPL *filename* nocon

1.2.3 Noprt

The PostScript output file is not sent to the printer.

Format: LPL *filename* noprt

NOTE : The ***filename*** must be the ***FIRST*** variable but the other three can be in any order.

1.3 Input File

The input file must have a file type of .RNO and the first line must be

```
.req "lpreq"
```

1.4 DSR Commands

For information on the DSR commands and flags see the *MicroVMS User's Manual*.

1.5 PMC Commands

The PMC commands are inserted into the text by using the special insert key in edit and the ascii character code.

The PMC commands are:-

1. ^@ associated with the insertion of a figure into text.
2. ^A associated with the use of subscripts.
3. ^B associated with the use of subscripts/superscripts.
4. ^C associated with the use of superscripts.
5. ^D associated with the use of subscripts/superscripts.
6. ^E associated with the use of subscripts/superscripts.
7. ^F associated with the use of numerators.
8. ^G associated with the use of numerators/denominators.
9. ^H associated with the use of denominators.
10. ^N associated with the generation of tables.
11. ^O associated with the generation of tables.
12. ^P associated with the generation of tables.
13. ^Q associated with the generation of tables.
14. ^R associated with the generation of equation numbers.

1.5.1 ^@ (ascii Character 0)

^@ (which must be preceded by an underscore (_) in the *filename*.RNO file) is followed by the name of a PostScript graphics file to be included at the current position. This flag and filename must be *THE ONLY TEXT ON THE LINE* in the output file from RUNOFF (use the DSR command .BREAK (.BR)).

Ensure that there is enough space for the graphics by using the DSR command .FIGURE (.FG) on the line ***BEFORE*** this command. If the DSR command .FIGURE DEFERRED (.FGD) is used the allocated space and the ^@ command may not be on the same page. Therefore it is advisable to check the *filename*.DAT file to make sure the allocated space and the ^@

command are on the same page before proceeding with the conversion to PostScript.

Position the graph in the LOWER LEFT-HAND CORNER of the page in the graphics PostScript file. The file must *NOT* include the PostScript command "*showpage*".

1.5.2 ^A (ascii Character 1)

^A writes the text that follows as a subscript until a ^B flag.

1.5.3 ^B (ascii Character 2)

^B marks the end of superscript or subscript text.

1.5.4 ^C (ascii Character 3)

^C writes the text that follows as a superscript until a ^B flag.

1.5.5 ^D (ascii Character 4)

^D marks the position where both superscript and subscript text are required.

1.5.6 ^E (ascii Character 5)

^E marks the end of superscript and subscript text.

1.5.7 ^F (ascii Character 6)

^F marks the start of the numerator text.

1.5.8 ^G (ascii Character 7)

^G marks the end of the numerator text and the start of the denominator text.

1.5.9 ^H (ascii Character 8)

^H marks the end of the denominator text.

1.5.10 ^N (ascii Character 14)

^N marks the start of a table and is followed by the number of rows, number of columns, width of each column, the start-stop position of each

horizontal line and then start-stop position of each vertical line.

This flag and the number of rows etc. are best on one line of the output file from RUNOFF. However, if this is not possible use the DSR command .BREAK (.BR), in the *filename*.RNO file, to replace a COMMA to continue the variables on the next line. The text for each row of the table must follow on *separate lines* of the output file from RUNOFF (use the DSR command .BREAK (.BR)). It is wise to use the DSR command .TEST PAGE (.TP) and/or check the *filename*.DAT file to make sure the command line and all of the table lines are on the same page.

1.5.10.1 Format For ^N Variables -

Rows and Columns

The number of rows and the number of columns must be followed by a comma.

Column Width

The width of the columns is given by character spaces. If each column is of a different size, separate the values with commas. However if two or more consecutive columns are of the same size, type the number of such columns followed by an asterisk (which must be preceded by an underscore (_) in the *filename*.RNO file) and the width followed by a comma; or if column widths are repeated over a number of columns, type the number of repeats then the column widths separated by commas enclosed in brackets followed by a comma.

Horizontal and Vertical Lines

The total number of horizontal lines is one more than the number of rows and the total number of vertical lines is one more then the number of columns. Start and stop values are separated by a minus sign. For the drawing of horizontal lines, the left-hand edge of the *nth* column is *n-1* and the right-hand edge of the *nth* column is *n*. Thus to draw a line the full width of a table five columns wide type 0-5. For the drawing of vertical lines, the top edge of the *nth* row is *n-1* and the lower edge of the *nth* row is *n*. Therefore the full length of a table of four lines would be 0-4. For lines of varying length the start-stop values are separated by a comma. If two or more consecutive lines are of the same length, type the number of such lines followed by the start-stop values enclosed in brackets then a comma. However if line lengths are repeated over a number of lines, type the number of repeats then the start-stop values separated by commas enclosed in brackets followed by a comma. If no line is required, make the start and stop values equal. For broken lines see PMC command ^Q.

1.5.11 ^O (ascii Character 15)

^O is used to separate text into the columns of the table.

Each line of the table must start and end with ^O and be on a single line in the RUNOFF output file (use the DSR command .BREAK (.BR)). For table entries where no text is required type ^O^O.

The text is centred about the middle of the column. To move the text one way or the other pad the appropriate end of the text with spaces by using the DSR flag # in the *filename*.RNO file. The text of each table entry has to be of the same style ie. all normal, all bold, all italic, all bold-italic or all special symbols.

1.5.12 ^P (ascii Character 16)

^P is used to indicate that text is to span more than one column of the table and is followed by the number of columns then by a comma.

1.5.13 ^Q (ascii Character 17)

^Q is used to indicate that a horizontal or vertical line is to be broken into a number of segments.

Follow ^Q with the number of segments required and a comma then the start-stop values for each segment.

1.5.14 ^R (ascii Character 18)

^R is used to indicate that an equation number is to be written at the end of this line. It is best to place this flag at the start of the line.

The equations are numbered sequentially starting at one. For equations in an appendix the equation number is appended to the appendix title.

1.6 Examples Using Various PMC Commands.

1) to include a PostScript file "a.ps" containing a figure, table, etc. which will occupy a space equivalent to 10 lines of text

type

```
the text before the figure
.fg 10
_^@a.ps
.br;the text after the figure
```

(Note : "a.ps" must have the figure, table, etc. at the lower left-hand corner of the page.)

2) to produce

$$S=\sum_{i=1}^{N}(\omega_{i_e}-\omega_{i_o})^2$$

type

```
S=∑^D^Ai=1^B^CN^E(ω^Ai^Ae^B-ω^Ai^Ao^B)^C2^B
```

3) to produce

$$t(s) = \frac{as^2+bs+c}{ds+e}$$

type

```
t(s) = ^Fas^C2^B+bs+c^Gds+e^H
```

4) to produce this table

Case	Method 1	Method 2	Method 3	Method 4
1	1.0	1.1	.9	1.2
2	10.1	9.9	not measured	
3	37.5	37.0	37.3	37.4

type

```
.i 11;^N4,5,6,4_*10,5(0-5),4(0-4),^Q2,0-2,3-4,0-4
.br;^OCase^OMethod 1^OMethod 2^OMethod 3^OMethod 4^O
.br;^O1^O#1.0^O#1.1^O##.9^O1.2^O
.br;^O2^O10.1^O#9.9^O^P2,not measured^O
.br;^O3^O37.5^O37.0^O37.3^O37.4^O
```

(Note : The DSR command .INDENT (.i) is used here to centralise the table between the left and right margins.)

5) to number the equations in examples 2) and 3) above.

$$S=\sum_{i=1}^{N}(\omega_{i_e}-\omega_{i_o})^2 \qquad (1)$$

$$t(s) = \frac{as^2+bs+c}{ds+e} \qquad (2)$$

type

```
^RS=Σ^D^Ai=1^B^CN^E(ω^Ai^Ae^B-ω^Ai^Ao^B)^C2^B
.b 1
^Rt(s) = ^Fas^C2^B+bs+c^Gds+e^H
```

1.7 Mathematical Symbols

Mathematical symbols may be obtained by using the special insert key in edit and the decimal value from the table in appendix A.

1.8 Letterhead

The letterheads available are :

1. use _^@head1 to obtain

AIRCRAFT STRUCTURES DIVISION
AERONAUTICAL RESEARCH LABORATORY
Defence Science & Technology Organisation Australia

506 Lorimer Street
Fishermens Bend Vic 3207

PO Box 4331 Melbourne Vic 3001
Phone : (03) 647 7626

Telex : AA39391
Fax : (03) 646 6771

2. use _^@head2 to obtain

AIRCRAFT STRUCTURES DIVISION
AERONAUTICAL RESEARCH LABORATORY

MINUTE PAPER

3. use _^@head3 to obtain

Vibration and Aeroelasticity Group
AIRCRAFT STRUCTURES DIVISION
AERONAUTICAL RESEARCH LABORATORY

MINUTE PAPER

A letterhead can be inserted by using the PMC command '@ and the required name as the first line of the page. If you do not use the DSR command .FIGURE (.FG) the letterhead will be positioned at the top of the page.

2 PLOT FILES

Following is a detailed user guide to the available PostScript graphic subroutines. A sample program showing the use of these subroutines is in appendix B.

2.1 Subroutines

Subroutines used to create PostScript plot files.

AXES	draws x-y axes and defines a new origin.
ENDPAGE	closes plot page.
INITPLT	defines plot parameters.
LABEL	writes a character string.
LINE	draws a line with or without symbols.
NEWORIGIN	sets a new origin
NEWPAGE	defines a new plot page.
SCALE	calculates a scale factor for a vector to be plotted.
SYMBOL	plots a symbol.

NOTE

A common block /PLT/LU,SFX,SFY is required for these subroutines.

where

LU	is the logical unit number for plot output file.
SFX	is the scale factor for the x-axis. i.e. the number of x units to be plotted per inch.
SFY	is the scale factor for the y-axis. i.e. the number of y units to be plotted per inch.

2.1.1 AXES

draws x-y axes and defines a new origin.

```
CALL AXES(XO,YO,SX,ORGX,TMAJX,LABX,NOCX,NDECX,
     SY,ORGY,TMAJY,LABY,NOCY,NDECY,BRD)
```

where

XO,YO	are the coordinates in inches of the lower left-hand corner of the desired plotting area relative to the lower left-hand corner of the page.
SX	is the length of the x-axis in inches. (minus for no line)
ORGX	is the minimum value of x.
TMAJX	is the distance in inches for tic marks on the x-axis border.

(minus for tic and numbers on actual axis)

LABX is the label for the x-axis.

NOCX is the number of characters in LABX. (NOCX=0 for no label)

NDECX is the number of decimal places after the decimal point for numbers on the x-axis.

SY is the length of the y-axis in inches. (minus for no line)

ORGY is the minimum value of y.

TMAJY is the distance in inches for tic marks on the y-axis border. (minus for tic and numbers on actual axis)

LABY is the label for the y-axis.

NOCY is the number of characters in LABY. (NOCY=0 for no label)

NDECY is the number of decimal places after the decimal point for numbers on the y-axis.

BRD is a logical*1 value to control the drawing of a border around the graph. .TRUE. draws a border

2.1.2 ENDPAGE

closes plot page.

```
CALL ENDPAGE
```

2.1.3 INITPLT

defines plot parameters.

```
CALL INITPLT
```

2.1.4 LABEL

writes a character string.

There are four versions of LABEL

- LABEL
- CPLABEL
- ELABEL
- MLABEL

all have the same calling format.

```
CALL LABEL(X,Y,NOZ,STR,ICF,HEIGHT,THETA,NOC)
```

where

X,Y are the coordinates that specify where the string is to be written. (see below)

NOZ =0 if X and Y are in inches relative to the lower left-hand

corner of the page.
= 1 if X and Y are in current units relative to the current origin.

STR	is the character string.
ICF	is the character font to be used (see appendix C).
HEIGHT	is the height in inches of the printed characters.
THETA	is the angle at which the characters will be printed.
NOC	is the number of characters in STR.

2.1.4.1 LABEL - The coordinates specify the lower left-hand corner of the first character in the string.

2.1.4.2 CPLABEL - The coordinates specify the lower edge of the centre of the string.

2.1.4.3 ELABEL - The coordinates specify the lower right-hand corner of the last character in the string.

2.1.4.4 MLABEL - The coordinates specify the centre of the string.

2.1.5 LINE

draws a line with or without symbols.

```
CALL LINE(X,Y,N,ISYM)
```

where

X	is the vector of x values to be plotted.
Y	is the vector of y values to be plotted.
N	is the number of points to be plotted.
ISYM	is the number of the symbol (see appendix D). (ISYM=0 draw line only)

2.1.6 NEWORIGIN

sets a new origin

```
CALL NEWORIGIN(X,Y)
```

where

X,Y	are the coordinates in inches relative to the lower left-hand corner of the page. (Default origin is at the lower left-hand corner of the page.)

2.1.7 NEWPAGE

defines a new plot page.

```
CALL NEWPAGE
```

2.1.8 SCALE

calculates a scale factor for a vector to be plotted.

```
CALL SCALE(VEC,ALEN,NPT,ORG,SF)
```

where

VEC	is the vector of data values.
ALEN	is the length over which the data are to be plotted.
NPT	is the number of data values.
ORG	is the adjusted minimum. (returned)
SF	is the scale factor. (returned)

2.1.9 SYMBOL

plots a symbol.

```
CALL SYMBOL(X,Y,ISYM)
```

where

X,Y	are the coordinates of the centre of symbol.
ISYM	is the number of the symbol. (see appendix D).

APPENDIX A

TABLE OF MATHEMATICAL SYMBOLS

symbol	dec
∀	128
#	129
∃	130
%	131
&	132
∍	133
*	134
≡	135
A	136
B	137
X	138
Δ	139
E	140
Φ	141
Γ	142
H	143
I	144
ϑ	145
K	146
Λ	147
M	148
N	149
O	150
Π	151
Θ	152
P	153

symbol	dec
Σ	154
T	155
Y	156
ς	157
Ω	158
Ξ	159
Ψ	160
Z	161
∴	162
⊥	163
¯	164
α	165
β	166
χ	167
δ	168
ε	169
ϕ	170
γ	171
η	172
ι	173
φ	174
κ	175
λ	176
μ	177
ν	178
o	179

symbol	dec
π	180
θ	181
ρ	182
σ	183
τ	184
υ	185
ϖ	186
ω	187
ξ	188
ψ	189
ζ	190
ϒ	191
′	192
≤	193
⁄	194
∞	195
ƒ	196
♣	197
♦	198
♥	199
♠	200
↔	201
←	202
↑	203
→	204
↓	205

symbol	dec
°	206
±	207
″	208
≥	209
×	210
∝	211
∂	212
•	213
÷	214
≠	215
≡	216
≈	217
…	218
|	219
—	220
↵	221
ℵ	222
ℑ	223
ℜ	224
℘	225
⊗	226
⊕	227
∅	228
∩	229
∪	230

symbol	dec
⊃	231
⊇	232
⊄	233
⊂	234
⊆	235
∈	236
∉	237
∠	238
∇	239
∏	240
√	241
·	242
¬	243
∧	244
∨	245
⇔	246
⇐	247
⇑	248
⇒	249
⇓	250
◊	251
⟨	252
Σ	253
⟩	254
∫	255

APPENDIX B

SAMPLE PROGRAM

```
      program example
      dimension x(1000),y(1000),y1(10),y2(10),y3(10),x1(10)
      character title1*45,title2*36
      common /plt/lu,sfx,sfy
      data y1/.5,.3,.75,.8,.8,.7,.6,.5,.6,.8/
      data y2/.2,.25,.3,.3,.35,.4,.45,.5,.5,.4/
      data y3/.4,.45,.6,.6,.55,.6,.8,.9,.95,.8/
      data x1/1.,2.,3.,4.,5.,6.,7.,8.,9.,10./
      lu=1
      open(unit=lu,file='example.plt',status='new')
      call initplt
      npts=1000
      r=0.0
      dr=0.01
      th=0.0
      dth=1.0
      x(1)=0.0
      y(1)=0.0
      do i=2,npts
       r=r+dr
       th=th+1.0
       x(i)=r*cosd(th)
       y(i)=r*sind(th)
      end do
      xlen=5.0
      ylen=5.0
      call scale(x,xlen,npts,xorg,sfx)
      call scale(y,ylen,npts,yorg,sfy)
      call axes(2.,4.,xlen,xorg,1.,'pressure coefficient',20,1,ylen,yorg,1.,
     *'density factor',14,1,.true.)
```

SAMPLE PROGRAM

```
  title1='Figure 3.  Effect of Inverse Temperature Ratio'
  call cplabel(4.5,3.0,0,title1,5,.2,0.0,45)
  call line(x,y,npts,0)
  call endpage
  call newpage
  sfx=2.0
  sfy=0.2
  title2='Figure 4a.  Results for Specimen Four'
  call axes(2.,4.,xlen,0.,.5,'spanwise position',17,0,ylen,0.,1.,'crack
*tip velocity',18,1,.true.)
  call cplabel(4.5,3.0,0,title2,5,.2,0.0,36)
  call line(x1,y1,10,7)
  call line(x1,y2,10,8)
  call line(x1,y3,10,9)
  call endpage
  stop
  end
```

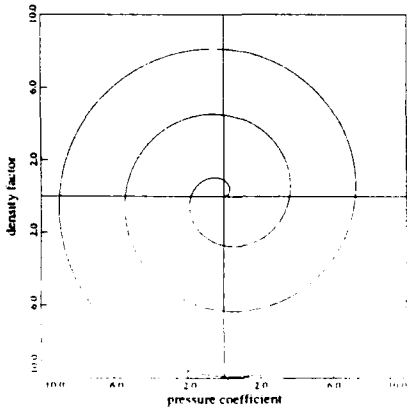

Figure 3 Effect of Inverse Temperature Ratio

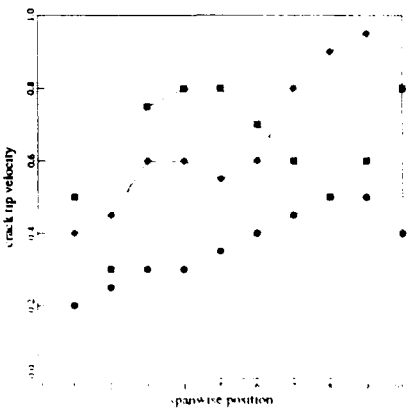

Figure 4a. Results for Specimen Four

APPENDIX C

CHARACTER FONTS

1	Times-Roman
2	*Times-Italic*
3	**Times-Bold**
4	***Times-BoldItalic***
5	Helvetica
6	*Helvetica-Oblique*
7	**Helvetica-Bold**
8	***Helvetica-BoldOblique***
9	Courier
10	*Courier-Oblique*
11	**Courier-Bold**
12	***Courier-BoldOblique***
13	AvantGarde-Book
14	*AvantGarde-BookOblique*
15	**AvantGarde-Demi**
16	***AvantGarde-DemiOblique***
17	LubalinGraph-Book
18	*LubalinGraph-BookOblique*
19	**LubalinGraph-Demi**
20	***LubalinGraph-DemiOblique***
21	NewCenturySchlbk-Roman
22	*NewCenturySchlbk-Italic*
23	**NewCenturySchlbk-Bold**
24	***NewCenturySchlbk-BoldItalic***
25	Souvenir-Light
26	*Souvenir-LightItalic*
27	**Souvenir-Demi**
28	***Souvenir-DemiItalic***

APPENDIX D

SYMBOLS

ISYM	SYMBOL
1	·
2	·
3	•
4	□
5	○
6	◇
7	■
8	●
9	◆
10	·

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Digital Standard Runoff is a utility provided by DEC for use on VAX computers. This utility creates formatted ascii text files of various simple lay-outs. However, it does not generate PostScript files or permit the inclusion of figures or algebraic expressions and equations. The present report describes a program which will permit the extension of RUNOFF to include these features. It also includes subroutines for the generation of PostScript graphic files, which can be included in the text files.

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